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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
BOYLE, ROBERT C	

ART UNIT	PAPER NUMBER
1796	

MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/584,400	TIRELLI ET AL.	
	Examiner	Art Unit	
	ROBERT C. BOYLE	1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 July 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *42-83* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *42-83* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 8, 2009 has been entered.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action. Claims 42-83 are pending.

3. Any rejections stated in the previous Office Action and not repeated below are withdrawn.

Claim Rejections - 35 USC § 112

First Paragraph

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claim 1 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

6. Claim 1 recites "…wherein said process doe not include the use of peracids or hydrogen peroxide." Applicant points to the specification, page 2, lines 20-25 and the Examples for support of the amendment.

7. Page 2, lines 20-25 of the specification discusses the drawbacks of using peracids and hydrogen peroxide. However, the cited portion does not state the negative limitation claimed. Reciting drawbacks of ingredients does not provide support for excluding the ingredients.

8. The Examples in the specification (page 16, line 33-page 19, line 12) do not state the negative limitation claimed. Rather, the Examples show the use of sodium percarbonate as the peroxide.

9. When evaluating claims for obviousness under 35 U.S.C. 103, all the limitations of the claims must be considered and given weight, including limitations which do not find support in the specification as originally filed (i.e., new matter). *Ex parte Grasselli*, 231 USPQ 393 (Bd. App. 1983) aff 'd mem. 738 F.2d 453 (Fed. Cir. 1984) (Claim to a catalyst expressly excluded the presence of sulfur, halogen, uranium, and a combination of vanadium and phosphorous. Although the negative limitations excluding these elements did not appear in the specification as filed, it was error to disregard these limitations when determining whether the claimed invention would have been obvious in view of the prior art.).

Second Paragraph

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

12. Claim 1 recites "...wherein said process doe not include the use of peracids or hydrogen peroxide." However, attention is drawn to page 4, lines 8-12 of the specification which states "the term 'hydrogen peroxide precursor' means a compound which, in the presence of water and/or by thermal decomposition, releases hydrogen peroxide." Because the use of a hydrogen peroxide precursor, as defined, necessarily involves the formation and hence *use* of hydrogen peroxide, the scope of claim 1 is unclear as to whether the use of hydrogen peroxide is included or not.

13. Further, it is noted that the combination of hydrogen peroxide and a carboxylic acid will form a peracid in situ (see instant specification: page 1, lines 32-35). Because the instant claims recite the combination of a carboxylic acid and a hydrogen peroxide generator, a peracid would be formed in situ. Therefore, it is unclear as to whether the scope of claim 1 includes the *use* of a peracid or not.

Claim Rejections - 35 USC § 103

14. Claims 42, 45-49, 51-51, 53-56, 62-65, 69-70, and 81-83 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stevens et al., (US 5,543,472) in view of Adam et al., *Methyltrioxorhenium(VII)-Catalyzed Epoxidation of Alkenes with the Urea/Hydrogen Peroxide Adduct*, Angew. Chem. Int. Ed. Engl. 1996, 35, No. 5, 533-535 as evidenced by Bull (US 4,590,286).

15. As to claims 42 and 61, Stevens teaches a process of producing an epoxidized polymer by adding the polymer, such as polyisoprene, and an acid and an epoxidizing agent, such as a percarboxylic acid and/or hydrogen peroxide, in an aqueous solution, followed by further addition of water, to a flask, mixing, and removing the polymer from the flask (abstract; column 1, lines 47-57; column 2, lines 5-46, 51-67; column 3, lines 21-55; column 4, lines 45-67; column 5, lines 1-53; column 7, line 7-column 8, line 53). It is noted that the addition of hydrogen peroxide or a hydrogen peroxide source to a carboxylic acid in the presence of a base will form a peracid (Bull: column 2, line 59-column 3, line 15).

16. Stevens does not teach the hydrogen peroxide precursor is selected from inorganic persalts, metal peroxides and hydrogen peroxide adducts. Adam teaches the epoxidizing agent is a urea/hydrogen peroxide adduct which epoxidizes in the absence of additional peracid or hydrogen peroxide (pages 533-534). It would have been obvious to one of ordinary skill in the art to use the urea adduct taught by Adam with the epoxidation process of Stevens because the urea adduct suppresses secondary reactions such as cleavage and rearrangement reactions and allows the peroxide concentration to be exactly dosed (Adam: page 533).

17. As to claim 45, Stevens teaches addition of the polymer as a solid (column 7, lines 50-67).

18. As to claim 46, Adam teaches the urea adduct is added to the mixing device as a solid (page 534).

19. As to claims 47-48, Stevens teaches epoxidation at 25-65°C (column 5, lines 1-27). The range taught by Stevens overlaps the claimed ranges. It is well settled that where prior art describes the components of a claimed compound or compositions in concentrations within or

overlapping the claimed concentrations a prima facie case of obviousness is established. See MPEP 2144.05; *In re Harris*, 409, F3.d 1339, 1343, 74 USPQ2d 1951, 1953 (Fed. Cir 2005); *In re Peterson*, 315 F.3d 1325, 1329, 65 USPQ 3d 1379, 1382 (Fed. Cir 1997); *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936-37 (CCPA 1990); *In re Malagari*, 499 F.2d 1297, 1303, 182 USPQ 549, 553 (CCPA 1974).

20. As to claim 49, Stevens teaches reaction time of ½ hour to 3 hours (column 5, lines 1-27). The range taught by Stevens overlaps the claimed ranges and overlapping ranges establish a prima facie case of obviousness. See MPEP 2144.05.

21. As to claim 51, Stevens teaches the final polymer has an epoxy content of 0.40 milliequivalents of epoxy per gram polymer (column 7, lines 40-45).

22. Even if Stevens does not teach the epoxy content as recited in claims 51-52, it is the examiner's position that the epoxy content is a result effective variable because changing it will clearly affect the type of product obtained. See MPEP 2144.05(B). Case law holds that "discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art." See *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In view of this, it would have been obvious to one of ordinary skill in the art to utilize the epoxy content within the scope of the present claims so as to produce desired end results.

23. As to claim 53, claims 53 states a property of the diene polymer: a Tg below 20°C. While Stevens does not elaborate on the property, Stevens teaches essentially the same diene polymer and process as that of the claimed, and one of ordinary skill in the art would have a reasonable basis to believe the diene polymer of Stevens exhibits essentially the same properties. Since the

PTO cannot conduct experiments, the burden of proof is shifted to the applicants to establish an unobvious difference. See *In re Best*, 562 F.2d 1252, 195 USPQ 430 (CCPA 1977).

24. Even if properties of the diene polymer of the instant claims and the prior art examples are not the same, it would still have been obvious to one of ordinary skill in the art to use a diene polymer having the claimed properties because it appears that the references generically embrace the claimed diene polymer and one of ordinary skill in the art would have expected all embodiments of the reference to work. Applicants have not demonstrated that the differences, if any, between the claimed diene polymer and the prior art give rise to unexpected results.

25. As to claim 54, Stevens teaches using polyisoprene (column 3, lines 21-32).

26. As to claim 55, Stevens teaches copolymerization with styrene (column 3, lines 21-32).

27. As to claim 56, Stevens teaches using butadiene polymers (column 3, lines 21-32).

28. As to claims 62-63 and 69-70, Stevens teaches using 29g of epoxidizing agent, which corresponds to about 6 phr (column 7, lines 7-16).

29. As to claims 64-65, Stevens teaches using acetic acid (column 7, lines 7-16).

30. As to claims 81-82, Stevens teaches adding 20 wt% water (column 7, lines 7-16).

31. As to claim 83, Stevens teaches adding water in more than one step (abstract; column 2, lines 5-46).

32. Claims 43-44, 49-52, 57, and 71-80 rejected under 35 U.S.C. 103(a) as being unpatentable over Stevens, Bull and Adam in view of Ohtsuka et al., (US 5,840,809). The discussion with respect to Stevens, Bull and Adam as set forth in paragraphs 14-31 above is incorporated here by reference.

33. As to claims 43-44, Stevens teaches a process of producing an epoxidized polymer by adding the polymer, such as polyisoprene, and an epoxidizing agent, such as a percarboxylic acid and/or a carboxylic acid/hydrogen peroxide solution, in an aqueous solution, followed by further addition of water, to a flask, mixing, and removing the polymer from the flask (abstract; column 1, lines 47-57; column 2, lines 5-46, 51-67; column 3, lines 21-55; column 4, lines 45-67; column 5, lines 1-53; column 7, line 7-column 8, line 53). Adam teaches the epoxidizing agent is a urea/hydrogen peroxide adduct which epoxidizes in the absence of additional peracid or hydrogen peroxide (pages 533-534).

34. Stevens and Adam do not teach reaction in an extruder. However, Ohtsuka teaches using a co-rotating twin screw extruder in an epoxidation of a polymer (abstract; column 6, lines 15-30; column 7, lines 32-45). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the processes of Stevens and Adam with the mixer taught in Ohtsuka because using the extruder allows for easier processing because the solvent removing capacity is large and the amount of scorched resin is small (Ohtsuka: column 7, lines 28-31).

35. As to claims 49-50, Ohtsuka teaches reaction time of 0.2-10 hours (column 6, lines 15-30). The range taught by Ohtsuka overlaps the claimed ranges and overlapping ranges establish a prima facie case of obviousness. See MPEP 2144.05.

36. As to claims 51-52, Ohtsuka teaches polymers with the epoxy equivalent ranging from 140-2700 (column 37, lines 27-31). The range taught by Ohtsuka overlaps the claimed ranges and overlapping ranges establish a prima facie case of obviousness. See MPEP 2144.05.

37. As to claim 57, Ohtsuka teaches polymers with molecular weights from 10,000-100,000 (column 4, lines 22-34).

38. As to claims 71-72, Ohtsuka teaches using nonionic surfactants that include fatty acid esters that include glycerol disterarate (column 12, lines 45-67).

39. As to claim 73, Ohtsuka teaches using stearamide (column 13, lines 3-5).

40. As to claim 74, Ohtsuka teaches that the non-ionic surfactant includes polyoxyethylene glycol ethers (column 13, lines 3-24).

41. As to claims 75-76, Ohtsuka teaches adding 0.05 to 1 phr of surfactant (column 12, lines 27-40).

42. As to claims 77-80, Ohtsuka teaches adding 0.005 to 10 phr of phenoloic stabilizer (column 2, lines 35-40).

43. Claim 59 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevens, Bull and Adam in view of Corey et al., *Buffered Potassium Peroxymonosulfate-Acetone Epoxidation of α,β-Unsaturated Acids*, J. Org. Chem. 1986, 51, 1925-1926. The discussion with respect to Stevens, Bull and Adam as set forth in paragraphs 14-43 above is incorporated here by reference.

44. As to claim 59, Stevens teaches a process of producing an epoxidized polymer by adding the polymer, such as polyisoprene, and an epoxidizing agent, such as a percarboxylic acid and/or a carboxylic acid/hydrogen peroxide solution, in an aqueous solution, followed by further addition of water, to a flask, mixing, and removing the polymer from the flask (abstract; column 1, lines 47-57; column 2, lines 5-46, 51-67; column 3, lines 21-55; column 4, lines 45-67; column 5, lines 1-53; column 7, line 7-column 8, line 53). Adam teaches the epoxidizing agent is a urea/hydrogen peroxide adduct which epoxidizes in the absence of additional peracid or hydrogen peroxide (pages 533-534).

45. Stevens and Adam do not teach using an inorganic persalt to perform epoxidizations. Corey teaches using potassium peroxymonosulfate as an epoxidizing agent. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the epoxidation process in Stevens and Adam with the peroxide precursor taught in Corey because potassium peroxymonosulfate allows the epoxidation reaction to be run at low temperatures with no need to control pH (Corey: page 1926).

46. Claim 60 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevens, Bull and Adam in view of Wurziger et al., (WO 01/83466). For translation reasons, the national stage entry, U.S. Patent Application Publication 2003/0055293, will be cited to. The discussion with respect to Stevens, Bull and Adam as set forth in paragraphs 14-45 above is incorporated here by reference.

47. As to claim 60, Stevens teaches a process of producing an epoxidized polymer by adding the polymer, such as polyisoprene, and an epoxidizing agent, such as a percarboxylic acid and/or a carboxylic acid/hydrogen peroxide solution, in an aqueous solution, followed by further addition of water, to a flask, mixing, and removing the polymer from the flask (abstract; column 1, lines 47-57; column 2, lines 5-46, 51-67; column 3, lines 21-55; column 4, lines 45-67; column 5, lines 1-53; column 7, line 7-column 8, line 53). Adam teaches the epoxidizing agent is a urea/hydrogen peroxide adduct which epoxidizes in the absence of additional peracid or hydrogen peroxide (pages 533-534).

48. Stevens does not teach using a metal peroxide to epoxidize the olefin. Wurzinger teaches using zinc peroxide in epoxidation reactions (abstract; paragraph 0033). It would have been

obvious to one of ordinary skill in the art to use the metal peroxide taught in Wurzinger with the epoxidation process taught in Stevens because a metal salt would be easy to separate from the reaction mixture in a phase separation and Wurzinger gives an epoxidation process that increases safety to the operators and the environment (Wurzinger: paragraph 0043).

49. Claims 66-68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stevens, Bull and Adam in view of Zhang et al., *Preparation of Epoxidized Rubber Using a Reactive Processing Technique. I. Synthesis and Characterization of Epoxidized Polybutadiene Rubber*, Journal of Applied Polymer Science, Vol 81, 2987-2992 (2001). The discussion with respect to Stevens, Bull and Adam as set forth in paragraphs 14-48 above is incorporated here by reference.

50. As to claim 66, Stevens teaches a process of producing an epoxidized polymer by adding the polymer, such as polyisoprene, and an epoxidizing agent, such as a percarboxylic acid and/or a carboxylic acid/hydrogen peroxide solution, in an aqueous solution, followed by further addition of water, to a flask, mixing, and removing the polymer from the flask (abstract; column 1, lines 47-57; column 2, lines 5-46, 51-67; column 3, lines 21-55; column 4, lines 45-67; column 5, lines 1-53; column 7, line 7-column 8, line 53). Adam teaches the epoxidizing agent is a urea/hydrogen peroxide adduct which epoxidizes in the absence of additional peracid or hydrogen peroxide (pages 533-534).

51. Stevens does not teach using a dicarboxylic acid. Zhang teaches using phthalic acid (scheme 1, page 2988). It would have been obvious to use the phthalic acid taught by Zhang with the epoxidation taught by Stevens because the peroxide of phthalic acid has easy preparation,

stability and is a solid at room temperature and give low levels of epoxidation with few side reactions (Zhang: pages 2988, 2992).

52. As to claims 67-68, Zhang teaches using phthalic anhydride (p 2988, first paragraph).

Response to Arguments

53. Applicant's arguments filed July 10, 2009 have been fully considered but they are not persuasive.

54. Applicant argues that the claims remain patentable over combination of Stevens and Adam because Stevens uses peracids and Adams relies on the use of a peracid. This is not persuasive.

55. Stevens teaches using a peracid to form an epoxide across a double bond (column 4, lines 59-65). Adam teaches the formation of an epoxide across a double bond using a urea/hydrogen peroxide adduct (pages 533-534). The rejections discussed above envision replacing the epoxidizing agent of Stevens (the carboxylic peracid/hydrogen peroxide) with the epoxidizing agent of Adam (the urea/hydrogen peroxide adduct). Because the combination of Stevens in view of Adam does not envision the use of hydrogen peroxide or peracids, Applicant's arguments are not persuasive.

56. Applicant argues that Stevens does not teach ethylenic unsaturated polymers because the polymers are hydrogenated before epoxidation occurs. This is not persuasive.

57. Applicant's note that the polymers have been partially hydrogenated (Remarks filed 7/10/09: page 14, lines 9-11). Partial hydrogenation is the hydrogenation of not all the unsaturation. Stevens states that hydrogenation percentages of greater than 50%, 95% and 98% can be achieved (column 4, lines 15-23). Stevens teaches examples with olefinic unsaturation in the partially hydrogenated polymer (column 6, lines 55-67; column 7, lines 1-6; column 8, lines 10-25). Because Stevens teaches partial hydrogenation, the polymers used by Stevens are not totally hydrogenated, and therefore unsaturation is present. Therefore, Applicant's argument is not persuasive.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ROBERT C. BOYLE whose telephone number is (571)270-7347. The examiner can normally be reached on Monday-Friday, 9:00AM-5:00PM Eastern.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan can be reached on (571)272-1119. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ROBERT C BOYLE/
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